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Facility Preliminary Energy Assessments and Recommendations

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Montgomery Independent School District

March 21, 2011

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F-4882

SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY:

This **Energy Efficient Partnership Service** is provided to public school districts and hospitals as a portion of the state's ***Schools/ Local Government Energy Management Program***; a program sponsored by the **State Energy Conservation Office (SECO)**, a division of the **State of Texas Comptroller of Public Accounts**.

Program Administrator:	Stephen Ross
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The service assists these public, non-profit institutions to take basic steps towards energy efficient facility operation. Active involvement in the partnership from the entire administration and staff within the agencies and institutions is critical in developing a customized blueprint for energy efficiency for their facilities.

In February 2011, **SECO** received a request for technical assistance from Keith Haws, Maintenance Director for **Montgomery I.S.D.** **SECO** responded by sending ESA **Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the school district. This report is intended to provide support for the district as it determines the most appropriate path for facility renovation, especially as it pertains to the energy consuming systems around the facility. It is our opinion that significant decreases in annual energy costs, as well as major maintenance cost reductions, can be achieved through the efficiency recommendations provided herein.

This study has focused on energy efficiency and systems operations. To that end, an analysis of the utility usage and costs for **Montgomery ISD,** (hereafter known as MISD) was completed by ESA **Energy Systems Associates, Inc**., (hereafter known as *Engineer*) to determine the annual energy cost index (ECI) and energy use index (EUI) for each campus or facility. A complete listing of the Base Year Utility Costs and Consumption is provided in Section 3.0 of this report.

Following the utility analysis and a preliminary consultation with *Dub Newberg, Energy Manager,* a walk-through energy analysis was conducted throughout the campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 7.0 of this report.

We estimate that as much as **$4,092** may be saved annually if all recommended energy efficiency projects (projects with paybacks of 10 years or less) are implemented. The estimated installed cost of these projects should total approximately **$22,400**, yielding an average simple payback of **5-1/2** years. In addition to these recommendations, there are other capital investment projects (projects with paybacks greater than 10 years) which will offer energy savings, but require additional time to offset the initial estimated project costs.

Table 1: Summary of Recommended Energy Cost Reduction Measures (ECRMs)

ENERGY EFFICIENCY RECOMMENDATIONS (ECRMs WITH PAYBACKS OF 10 YEARS OR LESS)

MEASURE	IMPLEMENTATION COST	PROJECTED ANNUAL SAVINGS	SIMPLE PAYBACK
HVAC ECRM 4 KITCHEN HOOD CONTROL	$ 200	$ 50	4 Years
LIGHTING ECRM 1 OCCUPANCY SENSORS	$ 400	$ 275	1-1/2 Years
LIGHTING ECRM 2 METAL HALIDE GYM FIXTURES	$ 16,800	$ 2,100	8 Years
ENVELOPE ECRM 1 VESTIBULE	$ 5,000	$ 1,667	3 Years
TOTAL	**$ 22,400**	**$ 4,092**	**5-1/2 Years**

Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Internal Rate of Return (IRR) may be significantly less for this retrofit program than has been calculated and shown in Section 8.0 of this report.

CAPITAL INVESTMENT PROJECTS (ECRMs WITH PAYBACKS GREATER THAN 10 YEARS)

MEASURE	IMPLEMENTATION COST	PROJECTED ANNUAL SAVINGS	SIMPLE PAYBACK
HVAC ECRM 1 MES PLANT RENOVATIONS	$ 625,000	$ 25,000	25 Years
HVAC ECRM 2 INTERMEDIATE PLANT RENOVATIONS	$ 625,000	$ 25,000	25 years
HVAC ECRM 3 HIGH SCHOOL PLANT RENOVATIONS	$ 1,465,000	$ 65,000	22-1/2 Years
TOTAL	**$ 2,715,000**	**$ 115,000**	**23-1/2 Years**

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with MISD. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

*ESA Energy Systems Associates, Inc. James W. Brown (512) 258-0547

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state to review the program elements that SECO provides to school districts and determine which elements could best benefit the district. A summary of the *Partner's* most recent twelve months of utility bills was provided to the engineer for the preliminary assessment of the Energy Performance Indicators. After reviewing the utility bill data analysis and consultation with SECO to determine the program elements to be provided to MISD, ESA returned to the facilities to perform the following tasks:

1. Designing and monitoring customized procedures to control the run times of energy consuming systems.
2. Analyze systems for code and standard compliance in areas such as cooling system refrigerants used, outside air quantity, and lighting illumination levels.
3. Develop an accurate definition of system and equipment replacement projects along with installation cost estimates, estimated energy and cost savings and analyses for each recommended project.
4. Develop a prioritized schedule for replacement projects.
5. Developing and drafting an overall Energy Management Policy.
6. Assist in the development of guidelines for efficiency levels of future equipment purchases.

3.0 ENERGY PERFORMANCE INDICATORS:

In order to easily assess the *Partner's* energy utilization and current level of efficiency, there are two key "Energy Performance Indicators" calculated within this report.

1. Energy Utilization Index

The Energy Utilization Index (EUI) depicts the total annual energy consumption per square foot of building space, and is expressed in "British Thermal Units" (BTUs).

To calculate the EUI, the consumption of electricity and gas are first converted to equivalent BTU consumption via the following formulas:

ELECTRICITY Usage

[Total KWH /yr] x [3413 BTUs/KWH] = _____ BTUs / yr

NATURAL GAS Usage

[Total MCF/yr] x [1,030,000 BTUs/MCF] = _____ BTUs / yr

After adding the BTU consumption of each fuel, the total BTUs are then divided

by the building area.

EUI = [Electricity BTUs + Gas BTUs] divided by [Total square feet]

2. Energy Cost Index

The Energy Cost Index (ECI) depicts the total annual energy cost per square foot of building space.

To calculate the ECI, the annual costs of electricity and gas are totaled and divided by the total square footage of the facility:

ECI = [Electricity Cost + Gas Cost] divided by [Total square feet]

These indicators may be used to compare the facility's current cost and usage to past years, or to other similar facilities in the area. Although the comparisons will not provide specific reasons for unusual operation, they serve as indicators that problems may exist within the energy consuming systems.

THE CURRENT MISD ENERGY PERFORMANCE INDICATORS:

CAMPUS	ENERGY UTILIZATION INDEX (EUI) BTUs/sf-year	ENERGY COST INDEX (ECI) $/sf-year
Montgomery ES	62,164	$1.43
Stewart Creek ES	63,933	$1.27
Intermediate	44,816	$1.10
Junior/Senior HS	53,325	$1.58

Montgomery ISD purchases electricity from Energy CAP. The transmission and distribution utility is Centerpoint. The energy history spreadsheets are shown on the next page.

The rate schedule analysis for the district is shown in Section 4.0.

A copy of the rate schedule is included in Appendix I

OWNER: Montgomery ISD **BUILDING:** Montgomery ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	129,247	624	624	Not delineated in billings. See rate Schedule	8,755	All Electric Facility	All Electric Facility
FEBRUARY	2010	165,710	643	643		10,534		
MARCH	2010	137,387	624	624		10,087		
APRIL	2010	144,562	586	586		14,424		
MAY	2010	154,162	629	629		11,653		
JUNE	2010	109,513	629	629		9,485		
JULY	2010	75,447	629	629		7,612		
AUGUST	2010	97,999	480	480		8,369		
SEPTEMBER	2010	137,855	547	547		10,179		
OCTOBER	2010	138,338	547	547		10,206		
NOVEMBER	2010	145,551	254	254		9,251		
DECEMBER	2010	112,410	557	557		11,130		
TOTAL		1,548,181	6,749	6,749	0	$121,685	0	$0

Annual Total Energy Cost = $121,685 Per Year

Total KWH x 0.003413 = 5,283.94 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 5,283.94 x 106

Floor area: 85,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 62,164 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $1.43 $/s.f. yr

Electric Utility	Meter#
Mid-South Synergy	E656617
	E656618

OWNER: Montgomery ISD **BUILDING:** Stewart Creek ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	92,000	420	420	Not delineated in billings. See rate Schedule	6,129	338	$2,364
FEBRUARY	2010	105,000	510	510		7,851	27	$271
MARCH	2010	102,000	490	490		10,509	228	$2,012
APRIL	2010	116,000	560	560		9,117	58	$523
MAY	2010	141,000	680	680		11,608	239	$2,107
JUNE	2010	84,000	500	500		7,565	91	$810
JULY	2010	85,000	560	560		7,858	9	$92
AUGUST	2010	164,000	690	690		12,271	14	$101
SEPTEMBER	2010	128,000	600	600		9,875	134	$1,058
OCTOBER	2010	132,000	610	610		10,165	135	$666
NOVEMBER	2010	91,000	410	410		8,815	114	$732
DECEMBER	2010	92,000	415	415		7,472	96	$557
TOTAL		1,332,000	6,445	6,445	0	$109,235	1,483	$11,293

Annual Total Energy Cost = $120,528 Per Year

Total KWH x 0.003413 = 4,546.12 x 106
Total MCF x 1.03 = 1,527.49 x 106
Total Other x ____ x 106
Total Site BTU's/yr 6,073.61 x 106

Floor area: 95,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 63,933 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $1.27 $/s.f. yr

Electric Utility	Meter#	Gas Utility Account #
Mid-South Synergy	E2579540	G820561

OWNER: **Montgomery ISD** **BUILDING:** **Intermediate**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	121,271	602	602	Not delineated in billings. See rate Schedule	8,452	All Electric Facility	All Electric Facility
FEBRUARY	2010	141,450	589	589		9,349		
MARCH	2010	61,868	574	574		6,021		
APRIL	2010	106,994	477	477		11,039		
MAY	2010	124,446	500	500		9,924		
JUNE	2010	99,750	507	507		8,518		
JULY	2010	82,154	486	486		7,565		
AUGUST	2010	122,643	487	487		10,189		
SEPTEMBER	2010	123,286	475	475		9,232		
OCTOBER	2010	104,598	459	459		8,131		
NOVEMBER	2010	86,526	466	466		8,119		
DECEMBER	2010	85,578	548	548		9,254		
TOTAL		1,260,564	6,170	6,170	0	$105,793	0	$0

Annual Total Energy Cost = $105,793 Per Year

Total KWH x 0.003413 = 4,302.30 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,302.30 x 106

Floor area: 96,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 44,816 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.10 $/s.f. yr

Electric Utility	**Meter#**
Mid-South Synergy	E1589016
	E656556
	E656654
	E656566
	E656720

OWNER: **Montgomery ISD** **BUILDING:** **Jr/Sr HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	403,516	1,417	1,417	Not delineated in billings. See rate Schedule	49,435	697	$9,681
FEBRUARY	2010	394,782	1,754	1,754		47,353	1051	$11,670
MARCH	2010	345,697	1,536	1,536		44,857	632	$6,286
APRIL	2010	445,759	1,620	1,620		51,433	360	$3,968
MAY	2010	505,609	2,168	2,168		59,913	251	$2,938
JUNE	2010	470,935	2,195	2,195		58,339	62	$827
JULY	2010	422,912	2,192	2,192		55,580	44	$573
AUGUST	2010	562,981	2,231	2,231		64,208	44	$583
SEPTEMBER	2010	687,753	2,250	2,250		68,625	172	$2,154
OCTOBER	2010	577,474	1,963	1,963		61,524	326	$3,983
NOVEMBER	2010	499,681	1,625	1,625		56,384	568	$6,597
DECEMBER	2010	366,871	1,932	1,932		49,160	578	$7,407
TOTAL		5,683,970	22,883	22,883	0	$666,811	4,785	$56,667

Annual Total Energy Cost = $723,478 Per Year

Total KWH x 0.003413 = 19,399.39 x 106
Total MCF x 1.03 = 4,929.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 24,328.39 x 106

Floor area: 457,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 53,235 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.58 $/s.f. yr

Electric Utility	**Meter#**
Mid-South Synergy	E105W

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

Electric Cooperative: Mid-South Synergy

Rate: CS (Commercial Service)

I.	**Customer Charge:**	$185 per Month
II.	**Demand Charge:**	$10.69 per kW Billing Demand
III.	**Energy Charge:**	$0.05749 per kWh
IV.	**Wholesale Power Cost Adjustment:**	Pass-through charge from wholesale provider to cover variable costs in fuel used to produce the electricity.

*Demand will be the highest 15 minute kW measurement or 85% of the highest demand occurring in the preceding months of June, July, August and September***.**

The minimum monthly bill as calculated in accordance with the above rate is $315.

Average Savings for consumption = $0.05749/kWh + WPCA/kWh = Varies per Month per WPCA Average for the analyzed billing cycle:

Average Savings for demand = $1.99 + $3.97 + $0.188 +$0.248 + $0.044 + $0.233457 = $ 10.69/kW

NATURAL GAS PROVIDER*:*

The rate schedule for Natural gas is unavailable; the average cost per MCF has been determined from the utility billings.

Average cost per MCF of purchased natural gas in the district was determined by analyzing the utility histories for the schools surveyed in this report over 12 consecutive month period.

Total cost for natural gas at the eight facilities in the analyzed billing cycle: $67,960

Total quantity purchased during the analyzed billing cycle: 6,268 MCF

Average cost per MCF (Commodity Cost) = Cost of natural gas – Customer Charges / quantity purchased = $67,960 / 6,268 MCF

Average cost per MCF = $10.84

5.0 CAMPUS DESCRIPTIONS:

Montgomery ISD consists of 4 educational campuses which are located in Montgomery County; in the City of Montgomery.

Table 2: School Facilities Analyzed For This Report

Facility	Year originally Constructed	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Montgomery Elementary	1970	85,000	Air cooled chilled water, electric hot water	Fan Coil Units (Plans to go with VAV); currently no pre-treatment of OA	100% T8 / Exterior lights under timeclock control	Pneumatic under Johnson control; plans to change to ALC
Stewart Creek Elementary	2002	95,000	Air cooled chilled water, gas fired hot water	Zoned air handlers with VAV terminal boxes	100% T8 / Exterior lights under timeclock control	Johnson DDC control; plans to change to ALC
Intermediate	1992	96,000	Air cooled chilled water, electric hot water	Fan Coil Units (Plans to go with VAV); currently no pre-treatment of OA	100% T8 / Exterior lights under timeclock control	Pneumatic under Johnson control; plans to change to ALC
Junior/Senior High School	1997	457,000	Air cooled chilled water, gas fired hot water	Rooftop air handlers	100% T8 / Exterior lights under timeclock control	Johnson DDC control; plans to change to ALC

The four surveyed campuses are the only campuses in the district with a Johnson controls system. Two campuses within the district have the same floor plan (one with Automated Logic controls and the other with Johnson controls) but have much different performance profiles within the district. The ALC campus operating under the same design conditions and standards as the Johnson controls school consumes 25% less energy to operate. As a result, the district has initiated plans to renovate all Johnson control systems with ALC.

Other projects that the district is planning to implement are:

Montgomery Elementary

1. Replacement of 25 year old air handlers and fan coil units with new air handlers and VAV boxes with hot water re-heat. The district will also install outside air damper controllers (the dampers are currently controlled manually) on dedicated outside air pre-treatment units.

Intermediate School and High School:

1. The Kitchen is to be fully re-modeled during the summer of 2011. *We recommend the district consider incorporating a gas-fired booster heater, or a chemical sanitizing system, for the dishwasher in order to minimize the hot water loop temperature required in the Kitchen space.*
2. *We also recommend the 45 kW electric steamer at the High School be replaced with a natural gas fired unit.*

Future design considerations:

The district stated that the Stewart Creek ES campus was to serve as a model for future Elementary and Intermediate facility construction projects. There were several observations noted during the survey that might have maintenance and energy benefits within the design strategy for this school that *we recommend the district consider for future projects based on this plan*.

1. Relocate existing VAV boxes from above each classroom to above the corridor just outside each classroom. This will serve to reduce noise in the classroom space and provide maintenance staff access to service the boxes regardless of student occupancy at the time service is required.

2. Install water cooled centrifugal chillers and a cooling tower instead of the air cooled chillers used in the current design. Air cooled chillers operate at approximately 1.3 kW/ton while water cooled systems operate at about 1.0 kW/ton including the extra power requirements of the cooling tower and condenser water pumps. The system currently encompasses approximately 300 tons of cooling capacity; the 0.3 kW/ton savings equals a total peak demand savings opportunity of 90 kW. At the current rate schedule, 90 kW represents an additional $962 per month of electric cost. Annually, this savings equals $11,545, or 10-1/2% of the total current electric bill. Water-cooled systems are more labor intensive than air cooled systems, but MISD contract maintenance services with an outside vendor that should be well-trained in water-cooled systems.

3. Install 2-lamp T8 light fixtures in the corridors. The Illumination Engineering Society of North America (IESNA) recommends that school corridors have 10-15 footcandles of illumination. We recommend schools maintain approximately 20-30 footcandles in school corridors. These levels are easily achievable with 2-lamp fixtures; the district is utilizing 3-lamp fixtures in the current design. On average, this design has approximately 150 corridor light fixtures. The third "extra" lamp in 150 fixtures consumes an additional 4.32kW of electrical demand and approximately 12,312 kWh per year. At the current electricity rates, this represents $908 per year of savings available to the facility by using the 2-lamp fixtures.

4. Ensure light illumination level design targets have been adjusted to the most current IESNA recommendations. Light levels measured in the Library were between 70 and 80 footcandles. This was the IESNA recommended light level for public school libraries 5-10 years ago. Current IESNA recommendations have reduced the Library recommendations to 50 footcandles to match the requirement in classroom and office areas (spaces where reading and writing tasks are performed). This lower requirement will allow fewer fixtures to be required in the space which saves initial construction costs, as well as maintenance and energy costs for the life of the building.

5. Incorporate daylighting control strategies for artificial fixtures located in areas with windows, skylights and lightwells. Some areas of the building, such as the lobby (see picture to the right that tested between 109 and 243 footcandles) and the window wall of the cafeteria, have more natural light supplied through fenestration than is required by IESNA for the space. The areas will require light fixtures for evening activities, therefore there are photocell lighting controls that measure the natural light levels in the space and only turn on the light fixtures when conditions require they operate. These systems are frequently complicated to retrofit into an existing lighting system; they are easily incorporated into a new lighting system.

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: REPLACEMENT OF OBSOLETE HVAC EQUIPMENT – Montgomery ES

It was noted during the survey, that some of the HVAC equipment is approaching, or has reached, the end of its useful life expectancy. Air cooled chillers have a life expectancy of 15-20 years; the two 1992 150-ton units at Montgomery Elementary are now 19 years old. *We recommend the district consider replacing this equipment in the next few years with new water-cooled centrifugal chillers, cooling tower and condenser water pumps to avoid possible emergency replacement costs associated with failure of large HVAC equipment. The cost estimate includes allocation for the chillers, cooling tower, new primary and secondary chilled water pumps, variable speed drives for the secondary chilled water pumps and for the cooling tower fans.*

Estimated Cost: $625,000 Estimated Savings: $25,000 Estimated Payback: 25 Years

Note: This price reflects a one to one replacement of the existing equipment. Comparison between this facility and the Intermediate School (which has the exact same chillers), shows that the Intermediate School chillers serve approximately 320 square feet per ton while MES serves about 280 square feet per ton. It might be possible to reduce the size of the MES equipment to match load requirements and reduce the renovation expense for the project.

HVAC ECRM 2: REPLACEMENT OF OBSOLETE HVAC EQUIPMENT – Intermediate

The chillers at this school are exactly the same as the ones at Montgomery ES. *We recommend the district consider replacing this equipment in the next few years with new water-cooled centrifugal chillers, cooling tower and condenser water pumps to avoid possible emergency replacement costs associated with failure of large HVAC equipment. The cost estimate includes allocation for the chillers, cooling tower, new primary and secondary chilled water pumps, variable speed drives for the secondary chilled water pumps and for the cooling tower fans.*

Estimated Cost: $625,000 Estimated Savings: $25,000 Estimated Payback: 25 Years

HVAC ECRM 3: REPLACEMENT OF OBSOLETE HVAC EQUIPMENT – High School

This campus has two central plants constructed around air-cooled chillers, one for the Main High School and one for the 9th Grade Center on this campus. The chillers are 215 ton units; the main plant has four 1997 units and the 9th Grade Center two 1997 units. The campus has the room available to convert these systems to water cooled systems as described for MES and the Intermediate School, but the district does not feel they have an option available to combine the two buildings into one central plant. *We recommend the district consider replacing the air-cooled chiller equipment with new water-cooled centrifugal chillers, cooling tower and condenser water pumps to avoid possible emergency replacement costs associated with failure of large HVAC equipment. The cost estimate includes allocation for the chillers, cooling tower, new primary and secondary chilled water pumps, variable speed drives for the secondary chilled water pumps and for the cooling tower fans.*

Estimated Cost: $1,465,000 Estimated Savings: $65,000 Estimated Payback: 22-1/2 Years

HVAC ECRM 4: CONTROL KITCHEN EXHAUST HOOD WITH CONTROL SYSTEM – Intermediate

The Kitchen exhaust hood at the Intermediate does not appear to be under the control of the energy management system. We recommend the district control the occupancy hours for the operation of the hood and that the existing switch(es) for the supply and exhaust fans be replaced with electro-magnetically held switches that automatically return to the off position as the circuit is de-energized by the energy management system. This guarantees that the fans must be turned on manually each day and cannot simply turn on when the energy management system energizes the circuit if the switches were not turned off by Kitchen staff at the close of the previous day's work.

Estimated Cost: $200 Estimated Savings: $50 Estimated Payback: 4 Years

Lighting ECRM 1: OCCUPANCY SENSOR INSTALLATION

There were several areas of the facilities that were noted to have artificial light fixtures operating during unoccupied periods. The first line of defense for the district to eliminate unnecessary fixture operation is to conduct staff training to turn lights off as the last occupant leaves the room. Studies have shown that linear fluorescent fixtures, the type of fixture most often found in classrooms, offer energy savings 23 seconds after they have been turned off. This calculation included consideration of the startup current required to turn the fixtures back on when the occupants return. If the training is unsuccessful in changing the behavior of the occupants, then automatic means of turning off the lights, most commonly occupancy sensors, can be employed to perform the task. Two locations where this strategy is available are the cafeterias at the Intermediate and High School. There are thirty-five 3-lamp and twenty-four 4-lamp T8 fluorescent light fixtures in these spaces, respectively, that were noted to be on during unoccupied periods; *we recommend installing occupancy sensors to ensure the lights are off when nobody is in these areas.*

Estimated Cost: $400 Estimated Savings: $275 Estimated Payback: 1-1/2 Years

Lighting ECRM 2: REPLACEMENT OF METAL HALIDE GYM FIXTURES TO T5 FLUORESCENT

The High School gymnasium has 48 each 400-watt metal halide fixtures over the court and recreation areas of the gymnasium. One characteristic of metal halide fixtures is their inherently long re-strike. This means that if the fixtures are ever turned off, it can take up to 15 minutes for them to come back on. This long re-strike encourages staff to leave the lights on throughout the day, even if the space is not occupied. *We recommend replacing the metal halides with 6-lamp T5 high-bay fixtures to improve overall light levels in the space and to allow the fixtures to be turned off during unoccupied periods of the day.*

Estimated Cost: $16,800 Estimated Savings: $2,100 Estimated Payback: 8 Years

Envelope ECRM 1: VESTIBULE FOR NORTH ENTRANCE DOORS

It was noted during the survey that the North-facing main entrance of the High School does not have a vestibule to serve as an air break between doors to minimize the intrusion of cold air into the back Lobby. We recommend the district consider constructing a small vestibule to protect the back lobby from cold air in the winter and warm air infiltration in the warmer months.

Estimated Cost: $5,000 Estimated Savings: $1,667 Estimated Payback: 3 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Timeclock for electric water heater
- Clean chiller coils more frequently
- Minimize mixing of domestic hot and cold water
- Limit air curtain operation to times door is open
- Repair damaged insulation rooftop chilled water pipe
- Seal seams to HS rooftop air handling units

Lighting

- De-lamp 3-lamp corridor fixtures.
- Train staff to use only outboard lamps as necessary.
- Turn off unnecessary fixtures during the daytime
- Retrofit T12 freezer/cooler fixtures with T8 lamps

Envelope

- Weatherstripping at exterior doors

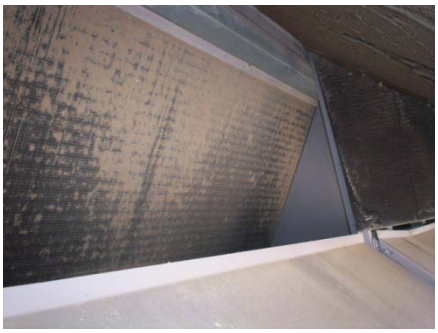
Maintenance and Operation procedures are strategies that can offer significant energy savings potential, yet require little or no capital investment by the district to implement. Exact paybacks are at times difficult to calculate, but are typically always less than one year. The difficulties with payback calculation are often related to the fact that the investigation required to make the payback calculation, for example measuring the air gap between exterior doors and missing or damaged weatherstripping so that exact air losses may be determined, is time and cost prohibitive when the benefits of renovating door and weather weatherstripping are well documented and universally accepted.

HVAC M&O 1

At Montgomery Elementary, there is an existing 36kW electric water heater that the staff reports will eventually be replaced with a gas-fired unit. We concur with the recommendation that the unit be replaced with a gas-fired unit, but also recommend that the existing electric unit be equipped with a timeclock that limits its operation to the weekday, student-occupied period only. With the residual hot water left in the tank, it is likely that the timer could turn off the water heater 1-2 hours before the final bell and still supply the required hot water for the occupants through the end of the day.

HVAC M&O 2

At Stewart Creek ES, the air cooled chiller coils were dirty (see picture to the right); *we recommend they be washed at the district's earliest convenience to improve airflow and efficiency of the chiller*.



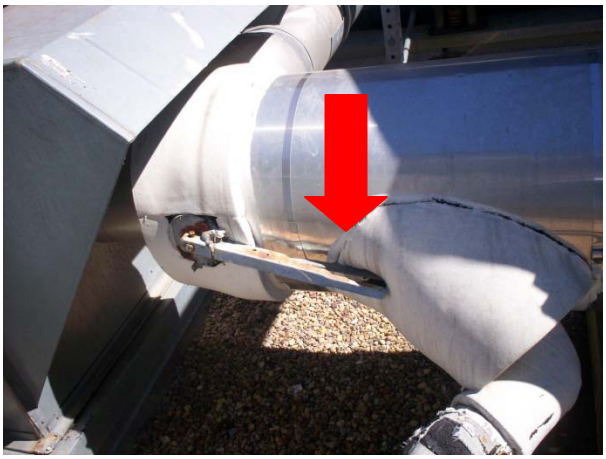
HVAC M&O 3

It was noted that the domestic water heater is set to supply a leaving temperature of 140°F, but is followed immediately by a temperature modulating valve that is blending cold water with the hot water for a 120°F supply loop temperature. *We recommend the district separate the loads from the water heater so that the 120°F load can be supplied without requiring blending from the cold water.*

HVAC M&O 3

There is an air curtain blower on top of the Kitchen loading dock door that is designed to minimize air infiltration as Kitchen supplies are loaded in and out of the facility, but the unit was operating while the Kitchen door was closed. *We recommend the district repair the door switch that is designed to prohibit operation of the air curtain when the door is closed.*

HVAC M&O 4



The insulation on the roof chilled water lines at MHS has areas where it has been cut to allow visual inspection or access to the piping. These areas were not re-sealed as the insulation was replaced over the cutout. *We recommend the district seal this insulation to prevent water from infiltrating the seam and compromising the integrity of the surrounding insulation.* In addition to the damaged insulation, it was discovered that the insulation adjacent to the chilled water supply balancing valves at Chiller-1 and Chiller-3 is preventing the valve from opening 100% (see picture to the right). *We recommend the district modify this insulation to allow the valve to open 100%.*

HVAC M&O 5

It was noted during the survey that the seams to the rooftop air handling units are leaking supply air to space. *We recommend the seams be taped or sealed with silicone caulk to prevent the leakage of the supply air.*

Lighting M&O 1

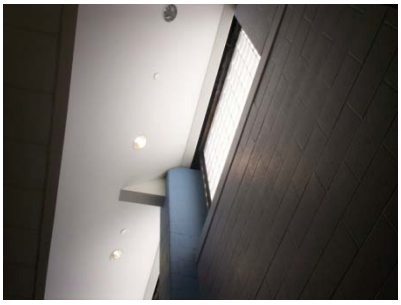
The corridors at Montgomery Elementary School utilize 3-lamp fixtures. Light levels in some areas of the corridors were as much as 102 footcandles in an area that IESNA recommends have 10-15 footcandles. We recommend the district remove the center lamp and tombstones from the approximately 156 corridor fixtures. Many of the corridors at Stewart Creek are also illuminated with 3-lamp fixtures.

Lighting M&O 2

There were several areas in Montgomery Elementary School where existing light levels were higher than that required by the IESNA standards and had existing dual switching that can be used to only turn on as many lamps in the fixtures as required to produce the recommended 50 footcandles in the space. Many classrooms that tested between 70 and 80 footcandles with all three lamps (both switches) energized demonstrated 50-60 footcandles when just the outboard lamp switch was turned on. The second switch just operates the center lamp for each fixture and is not necessary to produce enough light in the spaces to meet the standards during the daytime. The least expensive method to keep the inboard lamps off during the day is to train the teachers to turn just the outboard lamp switch on as they enter a room and leave the other switch off most of the time. If behavioral modification does not result in the inboard lamps being left off during the day, photocell control of the inboard lamps can be introduced to limit the operation of that circuit to times that the additional light is required in the space.

Another example of this issue was found in the gymnasium at Stewart Creek ES, where the gymnasium had 20 each 4-lamp T8 fixtures. With all of the lights on, the gymnasium has 120 footcandles on the court. With ½ of the fixtures off, the half closest to the glass block wall, there were 66 footcandles on the court. With all of the fixtures off, there remained 42 footcandles on the court; the IESNA recommendation for Elementary gymnasiums is 30 footcandles. At least ½ of these fixtures should be kept off during daytime hours.

Lighting M&O 3



At the Stewart Creek Elementary Cafeteria, there are six can fixtures mounted in an angled gypsum ceiling facing the windows (see picture to the right) that are designed to illuminate the backside of the windows in the space and were operating during the daytime hours. *We recommend these fixtures are turned off during the day, or perhaps removed completely as even at night, they would supply little or no illumination in the cafeteria space.*

Lighting M&O 4

The freezer/cooler light fixtures at the High School were not retrofit from T12 to T8 lamps with electronic ballasts at the time the rest of the facility fixtures were renovated. *We recommend the district renovate these fixtures with low-ambient start, electronic ballasts and T8 lamps.*

Envelope M&O 1

It was noted during the survey that some of the exterior doors had damaged or missing weatherstripping. This condition allows conditioned air to leak from the building and allows insects, humidity and non-conditioned air to infiltrate the building. *We recommend the district replace the damaged or missing weatherstripping at all exterior doors where necessary.*

8.0 FINANCIAL EVALUATION

Financing of these projects may be provided using a variety of methods such as Bond Programs, municipal leases, or state financing programs like the SECO LoanSTAR Program.

If the project was financed with in-house funds, the internal rate of return for the investment would be as follows:

Proposal:	Perform recommended ECRMs			
Assumptions:				
1. Equipment will last at least 15 years prior to next renovation				
2. No maintenance expenses for first five years (warranty period)				
3. $2,000 maintenance expense next 5 years				
4. $4,000 maintenance expense next 5 years				
5. Savings decreases 2% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($2,737,400)	$ -	0	($2,737,400)
Year 1		$ 119,092.00	0	$119,092
Year 2		$ 119,092.00	0	$119,092
Year 3		$ 119,092.00	0	$119,092
Year 4		$ 119,092.00	0	$119,092
Year 5		$ 119,092.00	0	$119,092
Year 6		$ 116,710.16	($2,000)	$114,710
Year 7		$ 114,328.32	($2,000)	$112,328
Year 8		$ 111,946.48	($2,000)	$109,946
Year 9		$ 109,564.64	($2,000)	$107,565
Year 10		$ 107,182.80	($2,000)	$105,183
Year 11		$ 104,800.96	($4,000)	$100,801
Year 12		$ 102,419.12	($4,000)	$98,419
Year 13		$ 100,037.28	($4,000)	$96,037
Year 14		$ 97,655.44	($4,000)	$93,655
Year 15		$ 95,273.60	($4,000)	$91,274
			Internal Rate of Return	**-6.16%**

More information regarding financial programs available to MISD can be found in:

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

9.0 GENERAL COMMENTS

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. All estimations provided in this report were based upon information provided to ESA by the District and their respective utility providers. While cost-saving estimates have been provided, they are not intended to be considered a guarantee of cost savings. No guarantees or warranties, expressed or implied, are intended or made. Changes in energy usage or utility pricing from those provided will impact the overall calculations of estimated savings and could result in different or longer payback periods.

APPENDICES

APPENDIX I - SUMMARY OF FUNDING AND PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

Several options are available for funding retrofit measures which require capital expenditures.

LoanSTAR Program:

The Texas LoanSTAR program is administered by the State Energy Conservation Office (SECO). It is a revolving loan program available to all public school districts in the state as well as other institutional facilities. SECO loans money at 3% interest for the implementation of energy conservation measures which have a combined payback of eight years or less. The amount of money available varies, depending upon repayment schedules of other facilities with outstanding loans, and legislative actions. Check with Eddy Trevino of SECO (512-463-1876) for an up-to-date evaluation of prospects for obtaining a loan in the amounts desired.

TASB (Texas Association of School Boards) Capital Acquisition Program:

TASB makes loans to school districts for acquiring personal property for "maintenance purposes". Energy conservation measures are eligible for these loans. The smallest loan TASB will make is $100,000. Financing is at 4.4% to 5.3%, depending upon length of the loan and the school district's bond rating. Loans are made over a three year, four year, seven year, or ten year period. The application process involves filling out a one page application form, and submitting the school district's most recent budget and audit. Contact Cheryl Kepp at TASB (512-467-0222) for further information.

Loans on Commercial Market:

Local lending institutions are another source for the funding of desired energy conservation measures. Interest rates obtainable may not be as attractive as that offered by the LoanSTAR or TASB programs, but advantages include "unlimited" funds available for loan, and local administration of the loan.

Leasing Corporations:

Leasing corporations have become increasingly interested in the energy efficiency market. The financing vehicle frequently used is the municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase agreement. Ownership of the financed equipment passes to the district at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period a nominal amount, usually a dollar, is paid by the lessee for title to the equipment.

Bond Issue:

The Board may choose to have a bond election to provide funds for capital improvements. Because of its political nature, this funding method is entirely dependent upon the mood of the voters, and may require more time and effort to acquire the funds than the other alternatives.

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:
The General Services Commission has competitively bid contracts for numerous items which are available for direct purchase by school districts. Contracts for this GSC service may be obtained from Sue Jager at (512) 475-2351.

Design/Bid/Build (Competitive Bidding):
Plans and specifications are prepared for specific projects and competitive bids are received from installation contractors. This traditional approach provides the district with more control over each aspect of the project, and task items required by the contractors are presented in detail.

Design/Build:
These contracts are usually structured with the engineer and contractor combined under the same contract to the owner. This type team approach was developed for fast-track projects, and to allow the contractor a position in the decision making process. The disadvantage to the district is that the engineer is not totally independent and cannot be completely focused upon the interest of the district. The district has less control over selection of equipment and quality control.

Purchasing Standardization Method:
This method will result in significant dollar savings if integrated into planned facility improvements. For larger purchases which extend over a period of time, standardized purchasing can produce lower cost per item expense, and can reduce immediate up-front expenditures. This approach includes traditional competitive bidding with pricing structured for present and future phased purchases.

Performance Contracting:
Through this arrangement, an energy service company (ESCO) using in-house or third party financing to implement comprehensive packages of energy saving retrofit projects. Usually a turnkey service, this method includes an initial assessment of energy savings potential, design of the identified projects, purchase and installation of the equipment, and overall project management. The ESCO guarantees that the cost savings generated will, at a minimum, cover the annual payment due over the term of the contract. The laws governing Performance Contracting for school districts are detailed in the Texas Education Code, Subchapter Z, Section 44.901. Senate Bill SB 3035, passed by the seventy-fifth Texas Legislature, amends some of these conditions. Performance Contracting is a highly competitive field, and interested districts may wish to contact Eddy Trevino of State Energy Conservation Office, (SECO), at 512-463-1896 for assistance in preparing requests for proposals or requests for qualifications.

Solution Center

How to Finance Your Energy Program

Cost and financing issues are pivotal factors in determining which energy-efficiency measures will be included in your final energy management plan. Before examining financing options, you need to have a reasonably good idea of the measures that may be implemented. For this purpose, you will want to perform cost/benefit analyses on each candidate measure to identify those with the best investment potential. This document presents a brief introduction to cost/benefit methods and then suggests a variety of options for financing your program.

Selecting a Cost/Benefit Analysis Method

Cost/benefit analysis can determine if and when an improvement will pay for itself through energy savings and to help you set priorities among alternative improvement projects. Cost/benefit analysis may be either a simple payback analysis or the more sophisticated life cycle cost analysis. Since most electric utility rate schedules are based on both consumption and peak demand, your analyst should be skilled at assessing the effects of changes in both electricity use and demand on total cost savings, regardless of which type of analysis is used. Before beginning any cost/benefit analyses, you must first determine acceptable design alternatives that meet the heating, cooling, lighting, and control requirements of the building being evaluated. The criteria for determining whether a design alternative is "acceptable" includes reliability, safety, conformance with building codes, occupant comfort, noise levels, and space limitations. Since there will usually be a number of acceptable alternatives for any project, cost/benefit analysis allows you to select those that have the best savings potential.

Simple Payback Analysis

A highly simplified form of cost/benefit analysis is called simple payback. In this method, the total first cost of the improvement is divided by the first-year energy cost savings produced by the improvement. This method yields the number of years required for the improvement to pay for itself.

This kind of analysis assumes that the service life of the energy-efficiency measure will equal or exceed the simple payback time. Simple payback analysis provides a relatively easy way to examine the overall costs and savings potentials for a variety of project alternatives. However, it does not consider a number of factors that are difficult to predict, yet can have a significant impact on cost savings. These factors may be considered by performing a life-cycle cost (LCC) analysis.

Simple Payback

As an example of simple payback, consider the lighting retrofit of a 10,000-square-foot commercial office building. Relamping with T-8 lamps and electronic, high-efficiency ballasts may cost around $13,300 ($50 each for 266 fixtures) and produce annual savings of around $4,800 per year (80,000 kWh at $0.06/kWh). This simple payback for this improvement would be

$$\frac{\$13{,}300}{\$4{,}800/\text{year}} = 2.8 \text{ years}$$

That is, the improvement would pay for itself in 2.8 years, a 36% simple return on the investment (1/2.8 = 0.36).

Life-Cycle Cost Analysis

Life-cycle cost analysis (LCC) considers the total cost of a system, device, building, or other capital equipment or facility over its anticipated useful life. LCC analysis allows a comprehensive assessment of all anticipated costs associated with a design alternative. Factors commonly considered in LCC analyses include initial capital cost, operating costs, maintenance costs, financing costs, the expected useful life of equipment, and its future salvage values. The result of the LCC analysis is generally expressed as the value of initial and future costs in today's dollars, as reflected by an appropriate discount rate.

The first step in this type of analysis is to establish the general study parameters for the

continued

Financing Mechanisms

Capital for energy-efficiency improvements is available from a variety of public and private sources, and can be accessed through a wide and flexible range of financing instruments. While variations may occur, there are five general financing mechanisms available today for investing in energy-efficiency:

- **Internal Funds.** Energy-efficiency improvements are financed by direct allocations from an organization's own internal capital or operating budget.
- **Debt Financing.** Energy-efficiency improvements are financed with capital borrowed directly by an organization from private lenders.
- **Lease or Lease-Purchase Agreements.** Energy-efficient equipment is acquired through an operating or financing lease with no up-front costs, and payments are made over five to ten years.
- **Energy Performance Contracts.** Energy-efficiency measures are financed, installed, and maintained by a third party, which guarantees savings and payments based on those savings.
- **Utility Incentives.** Rebates, grants, or other financial assistance are offered by an energy utility for the design and purchase of certain energy-efficient systems and equipment.

These financing mechanisms are not mutually exclusive (i.e., an organization may use several of them in various combinations). The most appropriate set of options will depend on the size and complexity of a project, internal capital constraints, in-house expertise, and other factors. Each of these mechanisms is discussed briefly below, followed by some additional funding sources and considerations.

Internal Funds

The most direct way for the owner of a building or facility to pay for energy-efficiency improvements is to allocate funds from the internal capital or operating budget. Financing internally has two clear advantages over the other options discussed below – it retains internally all savings from increased energy-efficiency, and it is usually the simplest option administratively. The resulting savings may be used to decrease overall operating expenses in future years or retained within a revolving fund used to support additional efficiency investments. Many public and private organizations regularly finance some or all of their energy-efficiency improvements from internal funds.

In some instances, competition from alternative capital investment projects and the requirement for relatively high rates of return may limit the use of internal funds for major, standalone investments in energy-efficiency. In most organizations, for example, the highest priorities for internal funds are business or service expansion, critical health and safety needs, or productivity enhancements. In both the public and private sectors, capital that remains available after these priorities have been met will usually be invested in those areas that offer the highest rates of return. The criteria for such investments commonly include an annual return of 20 percent to 30 percent or a simple payback of three years or less.

Since comprehensive energy-efficiency improvements commonly have simple paybacks of five to six years, or about a 12 percent annual rate of return, internal funds often cannot serve as the sole source of financing for such improvements. Alternatively, however, internal funding can be used well and profitably to achieve more competitive rates of return when combined with one or more of the other options discussed below.

Debt Financing

Direct borrowing of capital from private lenders can be an attractive alternative to using internal funds for energy-efficiency investments. Financing costs can be repaid by the savings that accrue from increased energy-efficiency. Additionally, municipal governments can often issue bonds or other long-term debt instruments at substantially lower interest rates than can private corporate entities. As in the case of internal funding, all savings from efficiency improvements (less only the cost of financing) are retained internally.

Debt financing is administratively more complex than internal funding, and financing costs will vary according to the credit rating of the borrower. This approach may also be restricted by formal debt ceilings imposed by municipal

policy, accounting standards, and/or Federal or state legislation.

In general, debt financing should be considered for larger retrofit projects that involve multiple buildings or facilities. When considering debt financing, organizations should weigh the cost and complexity of this type of financing against the size and risk of the proposed projects.

Lease and Lease-Purchase Agreements

Leasing and lease-purchase agreements provide a means to reduce or avoid the high, up-front capital costs of new, energy-efficient equipment. These agreements may be offered by commercial leasing corporations, management and financing companies, banks, investment brokers, or equipment manufacturers. As with direct borrowing, the lease should be designed so that the energy savings are sufficient to pay for the financing charges. While the time period of a lease can vary significantly, leases in which the lessee assumes ownership of the equipment generally range from five to ten years. There are several different types of leasing agreements, as shown in the sidebar. Specific lease agreements will vary according to lessor policies, the complexity of the project, whether or not engineering and design services are included, and other factors.

Energy Performance Contracts

Energy performance contracts are generally financing or operating leases provided by an Energy Service Company (ESCo) or equipment manufacturer. The distinguishing features of these contracts are that they provide a guarantee on energy savings from the installed retrofit measures, and they provide payments to the ESCo from the savings, freeing the customer from any need of up-front payments to the ESCo. The contract period can range from five to 15 years, and the customer is required to have a certain minimum level of capital investment (generally $200,000 or more) before a contract will be considered.

Under an energy performance contract, the ESCo provides a service package that typically includes the design and engineering, financing, installation, and maintenance of retrofit measures to improve energy-efficiency. The scope of these improvements can range from measures that affect a single part of a building's energy-using

Types of Leasing Agreements

Operating Leases are usually for a short term, occasionally for periods of less than one year. At the end of the lease period, the lessee may either renegotiate the lease, buy the equipment for its fair market value, or acquire other equipment. The lessor is considered the owner of the leased equipment and can claim tax benefits for its depreciation.

Financing Leases are agreements in which the lessee essentially pays for the equipment in monthly installments. Although payments are generally higher than for an operating lease, the lessee may purchase the equipment at the end of the lease for a nominal amount (commonly $1). The lessee is considered the owner of the equipment and may claim certain tax benefits for its depreciation.

Municipal Leases are available only to tax-exempt entities such as school districts or municipalities. Under this type of lease, the lessor does not have to pay taxes on the interest portion of the lessee's payments, and can therefore offer an interest rate that is lower than the rate for usual financing leases. Because of restrictions against multi-year liabilities, the municipality specifies in the contract that the lease will be renewed year by year. This places a higher risk on the lessor, who must be prepared for the possibility that funding for the lease may not be appropriated. The lessor may therefore charge an interest rate that is as much as 2 percent above the tax-exempt bond rate, but still lower than rates for regular financing leases. Municipal leases nonetheless are generally faster and more flexible financing tools than tax-exempt bonds.

Guaranteed Savings Leases are the same as financing or operating leases but with the addition of a guaranteed savings clause. Under this type of lease, the lessee is guaranteed that the annual payments for leasing the energy-efficiency improvements will not exceed the energy savings generated by them. The owner pays the contractor a fixed payment per month. If actual energy savings are less than the fixed payment, however, the owner pays only the small amount saved and receives a credit for the difference.

How to Finance Your Energy Program *continued*

Bulk Purchasing. Large organizations generally have purchasing or materials procurement departments that often buy standard materials in bulk or receive purchasing discounts because of the volume of their purchases. Such organizations can help reduce the costs of energy-efficiency renovations if their bulk purchasing capabilities can be used to obtain discounts on the price of materials (e.g., lamps and ballasts). While some locales may have restrictions that limit the use of this option, some type of bulk purchasing can usually be negotiated to satisfy all parties involved.

Project Transaction Costs. Certain fixed costs are associated with analyzing and installing energy measures in each building included in a retrofit program. Each additional building, for example, could represent additional negotiations and transactions with building owners, building analysts, energy auditors, equipment installers, commissioning agents, and other contractors. Similarly, each additional building will add to the effort involved in initial data analysis as well as in tracking energy performance after the retrofit. For these reasons, it is often possible to achieve target energy savings at lower cost by focusing only on those buildings that are the largest energy users. One disadvantage with larger buildings is that the energy systems in the building can be more difficult to understand, but overall, focusing on the largest energy users is often the most efficient use of your financial resources.

Direct Value-Added Benefits. The primary value of retrofits to buildings and facilities lies in the reduction of operating costs through improved energy-efficiency and maintenance savings. Nevertheless, the retrofit may also directly help address a variety of related concerns, and these benefits (and avoided costs) should be considered in assessing the true value of an investment. A few examples of these benefits include the improvement of indoor air quality in office buildings and schools; easier disposal of toxic or hazardous materials found in energy-using equipment; and assistance in meeting increasingly stringent state or Federal mandates for water conservation. Effective energy management controls for buildings can also provide a strong electronic infrastructure for improving security systems and telecommunications.

Economic Development Benefits. In addition to direct savings on operating costs and the added-value benefits mentioned above, investments in energy-efficiency can also support a community's economic development and employment opportunities. Labor will typically constitute about 60 percent of a total energy investment, and about 50 percent of equipment can be expected to be purchased from local equipment suppliers; as a result, about 85 percent of the investment is retained within the local economy. Additionally, funds retained in urban areas will generally be re-spent in the local economy. The Department of Commerce estimates that each dollar retained in an urban area will be re-spent three times. This multiplier effect results in a three-fold increase in the economic benefits of funds invested in energy-efficiency, without even considering the savings from lower overall fuel costs.

For more information contact the Rebuild America Clearinghouse at 252-459-4664 or visit www.rebuild.gov

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

MID-SOUTH synergy

COMMERCIAL SERVICE – SCHEDULE "CS"

I. APPLICABILITY

This rate applies to Commercial or Industrial Customers using more than 30 kW of Billing Demand (Minimum Peak Demand) or 750 kW or less of Billing Demand through a single meter.

II. TYPE OF SERVICE

Single or Three Phase, 60 hertz, at standard voltage.

III. MONTHLY RATE

The changes for service shall be in accordance with the following schedule

Availability Charge	**$185.00 per Month**
Demand Charge	**$10.69 per kW of Billing Demand**
Energy Charge	**$0.05749 per KWH**

IV. POWER FACTOR ADJUSTMENT

Where there is an indication of a power factor of less than ninety-five percent (95%) lagging, the Cooperative may, at its option, install the necessary metering equipment to adjust the actual demand to a ninety-five percent (95%) Power Factor ratio.

V. DETERMINATION OF BILLING DEMAND

The Billing Demand shall be based on the greater of the highest fifteen (15) minute kW measurement in the current month or eighty-five percent (85%) of the highest demand occurring in the preceding months of June, July, August and September.

VI. MINIMUM BILL

The minimum monthly charge for service as calculated in accordance with the above rate is $315.00.

MID·SOUTH synergy

VII. WHOLESALE POWER COST ADJUSTMENT

1. An amount as provided for in Schedule **"WPCA"** shall be added to the charges as calculated above. This charge is a billing adjustment to accommodate the changing cost of fuel used to generate electricity. This is a straight "pass-through" charge from the wholesale provider with no mark-up or margins applied.

VIII. TAXES

Applicable taxes will be added to the amount determined above.

IX. LATE PAYMENT PENALTY, RECONNECTION FEES AND OTHER MISCELLANEOUS FEES

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

Investing in our public schools, colleges and non-profit hospitals through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth, and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with _____, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

Principles of the Agreement

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

Acceptance of Agreement

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: Keith Haws
Date: 2/18/11
Name (Mr./Ms./Dr.) Mr. Keith Haws
Title: Director of Maintenance
Organization: Montgomery ISD
Phone: 936 597 6606
Street Address: 13763 Liberty St. Montgomery TX 77356
Fax: 936 597 6658
Mailing Address: P.O. Box 1475 Montgomery, TX 77356
E-Mail: Same
County: Montgomery

Contact Information:

Name (Mr./Ms./Dr.): Keith Haws
Title: Director of Maintenance
Cell Phone: (936) 444 7399 or (936) 597-6606
Fax: Same
E-Mail: khaws@misd.org
County: Montgomery

Please sign and mail or fax to: Stephen Ross, Schools and Education Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1770. **Fax 512-475-2569.**

AND fax to the SECO Contractor for this service, **Colby May,** ESA Energy Systems Associates, Inc. Phone: 512-258-0547, x124. **Fax: 512-388-3312.**

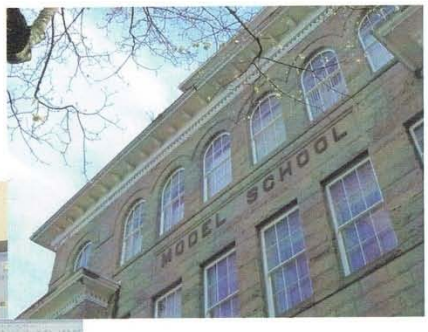
APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

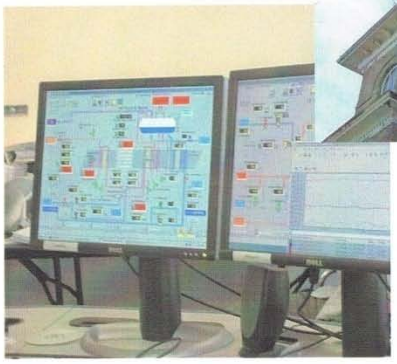
ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

A PROFESSIONAL ASSOCIATION FOR THOSE RESPONSIBLE FOR ENERGY MANAGEMENT IN TEXAS PUBLIC FACILITIES





- Networking
- Sharing Knowledge and Resources
- Training Workshops
- Regional Meetings
- Annual Conference
- Certification
- Legislative Updates
- Money-Saving Opportunities

WWW.TEXASEMA.ORG

Check the website for Membership and Association information.

SECO
State Energy Conservation Office

APPENDIX VI - UTILITY CHARTS ON CD